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EUROPEAN PATENT SPECIFICATION

15 Date of publication of patent specification: 14.06.89

16 Int. Cl.⁴: **A 01 K 39/012**

17 Application number: 83301344.4

18 Date of filing: 11.03.83

50 Adjustable feeder with brood gate.

51 Priority: 30.09.82 US 428847

52 Date of publication of application:
18.04.84 Bulletin 84/16

53 Publication of the grant of the patent:
14.08.89 Bulletin 89/24

54 Designated Contracting States:
BE DE FR GB IT NL SE

55 References cited:
FR-A-1 129 736
US-A-3 911 868

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Courier Press, Leamington Spa, England.

EP 0 105 571 B1

Description

This invention relates to animal feeding systems, and more particularly relates to a feeder for poultry and the like adapted to receive feed from a conveyor and to present the feed, said feeder including pan means for retaining and presenting delivered feed, drop tube means adapted to extend from the conveyor to a distal end above the pan means said distal end and said pan means being relatively displaceable to define a feed gate through which feed can pass to an innerpan means area.

Such a feeding system is known from US-A-3,911,868 and has proved highly successful in modern animal husbandry operations. These systems can supply feed mixtures to a large poultry flock with minimum operator effort. Both the amounts of feed delivered and the proportions of feed ingredients can be regulated and this regulation permits the flock to be inexpensively raised from chicks to mature, commercially valuable broiler birds in a relatively short time.

Among the important parts of such automated feeding systems are the feeder units or feeder pans. These units receive feed flow from a feed conveyor, and are disposed on or near the poultry house floor to afford the birds ready access to the feed.

When raising broiler flocks, poultry husbandman traditionally introduce very young chicks to a poultry house, and provide feed for the chicks on paper, cardboard, or the like which are laid on the poultry house floor. After the chicks grow in size, they can be introduced to feed contained in poultry feeders.

It is the object of the present invention to provide a feeder which encourages use from the day the small chicks are introduced into a poultry house through the day the adult birds are removed. This object is obtained according to the invention by at least one brood gate opening being defined in the drop tube means above the distal end, and means for alternatively masking and exposing the brood gate opening so as to permit feed flow, when the brood gate opening is exposed, from the conveyor through a upper interior portion of the drop tube means, thence out through the brood gate opening, and thence down the outside of the drop tube means to an outer pan means area for consumption by relatively immature poultry, and to alternatively permit feed flow, when the brood gate opening is masked, from the conveyor through upper and thence lower interior portions of the drop tube means and past the drop tube means distal end, the distal end and pan means together defining said feed gate through which feed can pass to said inner pan means area for consumption by relatively mature poultry.

Due to these features one obtains a feeder having a configuration and mode of operation especially designed for small chicks, in which feed is presented at an exterior part of the feed pan, whilst this feeder has a second configuration

and mode of operation for older birds, in which feed is presented at an interior part of the feed pan.

According to a useful embodiment, the means for alternately masking and exposing said brood gate opening is formed by a collar assembly movably surrounding said drop tube means, which assembly is directed coupled to the pan means permitting the drop tube means to move with limited axial motion therethrough so as to cause a simultaneous exposition of said opening with a closing of said feed gate or a masking of said opening with a freeing of said gate. Said features render it possible to provide a feeder which will change automatically from one configuration and operating mode to the other as the feeder is raised from and lowered to the poultry house floor.

The invention will be more extensively elucidated in the following detailed description and upon reference to the drawings.

FIGURE 1 is a perspective view showing a poultry house in which are installed several novel feeders of the present invention;

FIG. 2 is a perspective view showing in greater detail the novel feeder during its use by immature chicks;

FIG. 3 is a side elevational view in partial section showing the novel feeder and related apparatus as they appear when immature birds are being fed;

FIG. 4 is a side elevational view in partial section similar to FIG. 3 but showing the feeder as it appears when mature birds are being fed;

FIG. 5 is a side elevational view in partial section similar to FIGS. 3 and 4 but showing the feeder as it appears when adjusted for another type of feed;

FIG. 6 is a fragmentary sectional view taken substantially in the plane of line 6-6 in FIG. 4;

FIG. 7 is a fragmentary sectional view taken substantially in the plane of line 7-7 in FIG. 8;

FIG. 8 is a fragmentary sectional view taken substantially in the plane of line 8-8 in FIG. 2, showing portions of the feeder grill and pan as they appear when closed for use; and

FIG. 9 is a fragmentary sectional view similar to FIG. 8 but showing the grill and pan as they appear when opened for cleaning.

Detailed Description

While the invention will be described in connection with a preferred embodiment, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention.

Turning first to FIG. 1, there are shown several feeders 10 of the present invention as they appear when being used by poultry P. A feed storage bin 11 is located outside a poultry house 12, and a header conveyor 13 transports feed from the bin 11 to one or more cross or branch conveyors 14. As shown in FIGS. 2-5, these branch conveyors

14 include a conveyor tube 15, and a helical auger member 16 is disposed for rotation within the tube 15 by a motor (not shown). Header drop tubes 17 and intermediate hoppers 18 or other devices insure the correct delivery of feed from the header conveyor 13 to the branch conveyor 14 (FIG. 1).

A general examination of FIGS. 2-5 will show that the novel feeder 10 includes a pan means 21 for retaining and presenting delivered feed. This pan means 21 can be considered to include a central cone 22 and an adjacent inner portion 23, which here is oriented horizontally. A rising outer pan portion 24 leads to a steeper portion 25 and terminates in a pan rim 26.

A drop tube means 31 is adapted to extend from the conveyor 14 down into the pan 21. As can be envisioned from FIGS. 3-5, feed delivered by the conveyor 14 through a tube hole 19 falls down the interior of the drop tube assembly 31 and into the pan 21. Here, this drop tube assembly 31 terminates at a distal end 32. A skirt 33, of generally conical configuration, extends away from the main cylinder 36 of the drop tube means 31 to a skirt distal end 34. To minimize expense, the skirt 33 can be formed integral with the adjacent portions of the drop tube main cylinder 36.

A collar assembly 50 surrounds the drop tube 31, and is held above the pan 21 by grillwork 60. This grill means or grillwork 60 interconnects the collar 50 and pan means 21 so as to affix the collar 50 at a predetermined location above the pan. To this end, the grill means includes a plurality of spokes 62, 64, 66 extending outwardly from the collar, to a grill rim 68. The rim 68 interconnects the spokes at their outer end and continuously engages a mating rim 26 of the pan means 21.

In accordance with the invention, the illustrated feeder can be used to present feed to either immature poultry, or to older, larger, more mature birds. To accomplish this, a brood gate opening 40 is defined in the drop tube cylinder 36 above the drop tube means distal end 32 and above the top of the skirt 33. A relatively uniform quantity of feed can be provided around the entire circumference of the pan by defining two, three, or more feed brood gate openings in the drop tube means.

The drop tube means 31 is of sufficient vertical extent so that, when it is moved downwardly to a first non-pan-carrying position, the drop tube means distal end 32 and/or skirt means distal end 34 substantially engage the pan means 21, thereby inhibiting feed flow into the inner portion of the pan means from the bottom of the drop tube. Rather, feed is permitted to flow from the conveyor 14 through an upper interior portion of the drop tube means 31, then out the exposed or unmasked brood gate opening 40, and then down the outside of the skirt means 33 to an outer pan area. By dispensing a relatively large amount of feed through the brood gate opening 40, the feed can be accumulated and displayed in the position and manner shown in FIG. 3 so that the immature

poultry or chicks C can find it and consume it. Conveniently, this feeder configuration is obtained by permitting the pan 21 to rest on the poultry house floor F, and by permitting the drop tube 31 to slide down through the collar 50 so as to rest the distal ends 32 and 34 in the pan 21. As feed builds up in the pan 21, the brood gate opening 40 is covered; in this way, excessive feed delivery and buildup is discouraged, and feed wastage is inhibited.

After the chicks have grown for, say, five to ten days, they are able to reach interior portions of the feeder, and to obtain feed from even a slightly elevated pan. Accordingly, the drop tube 31 can be raised and the feeder automatically reconfigured for use by the more mature poultry. To reconfigure the feeder, the conveyor 14 is raised; here, this raising action is accomplished by drawing up the cables 42 and interconnecting hangers 43.

When the drop tube means 31 is raised into the second, pan-carrying positions shown in FIGS. 4 and 5, the brood gate opening 40 is masked by the collar means 50 and the drop tube and skirt distal ends 32 and 34 are pulled away from the pan 21. Under these circumstances, a first gate opening G-1 is defined between the drop tube distal end 32 and the pan means 21, and a second feed flow gate G-2 is defined between the skirt means distal end 34 and the pan means 21. Feed is thus permitted to flow from the conveyor 14 through upper and lower interior portions of the drop tube 31, then past the drop tube distal end 32, past the skirt distal end 34, and into an inner pan means area where it can be reached for consumption by the relatively mature poultry.

To dependently support the grillwork 60 and pan 21 above the floor F, and to provide the gates G-1 and G-2, the drop tube cylinder 36 is provided with a shoulder 37. When the drop tube assembly 31 is pulled up, this shoulder 37 engages a bottom interior corner 38 of the collar 50. In use, the pan means 21 can be conveniently located at least a small distance above the poultry house floor F, as can be envisioned by comparing FIGS. 4 and 5 with FIG. 3. In this way, relatively small amounts of feed can be dispensed and displayed for consumption by the relatively mature poultry P. These birds have learned to eat from the pan, of course, and the design of the feeder unit inhibits raking, tossing, and wasting the feed.

In accordance with another aspect of the invention, the poultry feeder and the feed gates G-1 and G-2 can be adjusted so as to best accommodate any of various types of feed being delivered to the older birds. For example, relatively moist feed can be somewhat sticky in its consistency, and can require relatively large feed gate openings to accommodate proper dispensation. On the other hand, relatively dry feed requires relatively small feed gate openings to offer dispensation in a proper manner. To this end, then, the collar assembly 50 surrounding the drop tube includes a first screw cam element 51, which here constitutes an outer grill collar ring. A second screw

cam element 52 is adapted to loosely surround the drop tube means central cylinder 38, as especially shown in FIGS. 3-5 and 7. The lower corner 38 of this element 52 directly engages the drop tube shoulder 37 when the drop tube 31 is pulled upwardly. Projections 54, 55 on the second cam element 52 form a helical cam track or female screw thread of extended pitch which engages a mating helical male thread projection 56 formed on the first cam element 51. As can be envisioned by comparing FIGS. 4 and 5, relative motion between the first and second screw cam elements 51, 52 causes the pan 21 to move up or down relative to the drop tube 31 and its shoulder 37 and the distal ends 32, 34. This relative motion causes consequent adjustment in the sizes of the first gate G-1 and second gate G-2. In this way, the poultryman can adjust the amount of feed which is presented in the inner portion of the pan to the consuming, mature, poultry. It has been found that a minimum gate space of about 1/2 inch and a maximum gate space of about 1-3/8 inch at the second gate G-2 provides a suitable variation so as to properly display and present a variety of types and amounts of feed. This gate variation is designed to accommodate variations in feed adhesive characteristics or consistency for a wide variety of feed formulations.

In carrying out the invention, the poultry husbandman can be provided with a clear indication of the gate settings. To do this, several reference numeral indicia can be applied around a collar top annular extension 57 adjacent the drop tube assembly 31 as shown in FIG. 6. An embossed indicator, such as an arrow symbol 58 can be formed on one of the spokes 62. By aligning the indicator 58 with a given indicia number on the collar 57, a feed gate space of known size can be provided.

To secure the screw cam elements in a selected given position, and consequently locate the feed gates G-1 and G-2 in desired positions or sizes, one or more embossments 59 can be formed on one of the screw cam elements 52, and a discrete series of mating recesses 69 can be formed on the other of the screw cam elements 51 to provide a more or less secure locking arrangement. When the embossments 59 and the recesses 69 are formed on confronting surfaces in the interior of the assembled screw cam 51, 52 as shown in FIG. 6, the arrangement minimizes the interference of dirt with the screw cam detent action.

As shown in FIGS. 6 and 7, the screw cam elements 51 and 52 are normally locked together, but the locked elements 51 and 52 can rotate freely about the encircled drop tube cylinder 38. Thus, the collar 50, grillwork 60 and pan 21 can rotate relative to the drop tube 31. If the poultry accidentally or intentionally cause this rotation, any feed bridges within the drop tube 31 or at the feed gates G-1 or G-2 can be broken, and temporarily pent-up feed will flow into the pan for consumption. A positive flow of feed is thus encouraged.

When the feeder is in use as shown in FIGS.

1-5 the grill rim 68 continuously engages the pan rim 28. To further discourage feed raking and tossing, an anti-rake grill rim extension 70 overlies the extreme outer portions of the pan 21. It is contemplated that the pan 21 and other feeder parts can be formed of a suitable resinous plastic having the trade marks Hercules 7523 polypropylene or Shell Chemical 7522 polypropylene by any of several known molding processes. By forming the anti-rake extension 70 on the grill rim 68, a difficult-to-accommodate undercut formation will be avoided in the pan molding design and process.

It is another feature of the invention that the feeder unit can be easily opened and cleaned after the flock has been removed from the poultry house. To this end, the pan 21 is provided with one or more slots 71 adjacent the pan rim 28, as shown in FIGS. 8 and 9. At one of these slots, a more or other convenient supplemental attachment 72 attaches the pan 21 to the grill rim 68 at but a single point. This permits the poultryman to raise the feeders from the floor, and pull or pivot the pan 21 away from the grill rim 68, as shown in FIG. 9. When the feeder is opened in this way, the unit can be easily, quickly and thoroughly cleaned.

Claims

1. A feeder (10) for poultry (P) and the like adapted to receive feed from a conveyor (14) and to present the feed, said feeder including pan means (21) for retaining and presenting delivered feed, drop tube means (31) adapted to extend from the conveyor (14) to a distal end (32) above the pan means (21) said distal end (32) and said pan means (21) being relatively displaceable to define a feed gate (G-1) through which feed can pass to an innerpan means area (23), the feeder being characterized by at least one brood gate opening (40) being defined in the drop tube means (31) above the distal end (32), and means (50) for alternatively masking and exposing the brood gate opening (40) so as to permit feed flow, when the brood gate opening (40) is exposed, from the conveyor (14) through an upper interior portion of the drop tube means (31), thence out through the brood gate opening (40), and thence down the outside of the drop tube means (31) to an outer pan means area (24) for consumption by relatively immature poultry, and to alternatively permit feed flow, when the brood gate opening (40) is masked, from the conveyor (14) through upper and thence lower interior portions of the drop tube means (31) and past the drop tube means distal end (32), the distal end (32) and pan means (21) together defining said feed gate (G-1) through which feed can pass to said inner pan means area (23) for consumption by relatively mature poultry.

2. A feeder according to claim 1 characterized in that said means for alternately masking and exposing said brood gate opening (40) is formed by a collar assembly (50) movably surrounding

said drop tube means (31).

3. A feeder according to claim 2 characterized in that the collar assembly (50) for alternately masking and exposing the brood gate opening (40) in the drop tube means (31) is directly coupled to the pan means (21) permitting the drop tube means (31) to move with limited axial motion there-through so as to cause a simultaneous exposition of said opening (40) with a closing of said feed gate (G-1) or a masking of said opening (40) with a freeing of said gate (G-1).

4. A feeder according to claim 2 or 3 characterized in that the collar means (50) comprise screw cam means having a first screw cam element (51) affixed to said collar means (50), and a second screw cam element (52) cooperable with said drop tube means (31), whereby relative motion of the first and second screw cam elements (51, 52) causes adjustment in the size of said first feed gate (G-1), and consequent adjustment of the feed flow through the first feed gate (G-1).

5. A feeder according to claim 4 characterized by detent means (59, 69) interposed between said first and said second screw cam elements (51, 52) for securing the screw cam elements (51, 52) in any one of a discrete number of pre-selected positions.

6. A feeder according to anyone of the preceding claims characterized by skirt means (33) extending downwardly and outwardly from said drop tube means (31) to a second distal end (34) to define, with the pan means (21), a second feed gate (G-2) downstream of the first feed gate (G-1) through which feed can pass into the pan means (21) for consumption by poultry (P).

7. A feeder for poultry according to claim 6 characterized in that the skirt means (33) also define a feed-flow-directing shield to direct feed flow from the brood gate opening (40) to an outer portion of the pan means (24) for consumption by relatively immature poultry.

8. A feeder according to claim 3, characterized in that said drop tube means (31) and skirt means (33) are of such vertical extent that, when the drop tube means (31) is moved relative to the collar means (50) so as to expose the brood gate opening (40), the drop tube means distal end (32) and/or skirt means distal end (34) substantially engages the pan means (21), thereby inhibiting feed flow into the inner portion (23) of the pan means (21).

9. A feeder according to claim 3, characterized by grill means (80) interconnecting the collar means (50) and pan means (21) so as to couple the collar means (50) at a predetermined location above the pan means (21).

10. A feeder according to claim 9, characterized in that said grill means (80) is constituted by a plurality of spokes (62, 64, 66) extending outwardly from the collar means (50), and grill rim means (68) interconnecting the spokes (62, 64, 66) at their outer ends and adapted to continuously engage a rim (26) of the pan means (21).

11. A feeder according to claim 9 or 10, charac-

terized in that said drop tube means (31) comprises shoulder means (37) adapted to engage said collar means (50), whereby said grill means (80) and said pan means (21) can be dependently supported from said drop tube means (31).

12. A feeder according to claim 11, characterized in that said pan means (21) comprises temporary, supplemental attachment means (72) for attaching said pan means (21) to said grill rim means (68) at but a single point, whereby to permit said pan means (21) to be pivoted away from said grill means (68) for feeder cleaning.

13. A feeder according to any of claims 10-12 characterized in that said grill rim means is provided with inwardly extending anti-rake extension means (70).

Patentansprüche

1. Futtertrog (10) für Geflügel (P) od.dgl., dem zum Bereithalten über eine Fördereinrichtung (14) Futter zuführbar ist; mit einer Schlüsselanordnung (21) zum Aufnehmen und Bereithalten des zugeführten Futters; mit einer an die Fördereinrichtung (14) angeschlossenen Fallrohranordnung (31), deren freies Ende (32) oberhalb der Schlüsselanordnung (21) angeordnet ist; und bei dem die Schlüsselanordnung (21) relativ bewegbar ist, um eine Fütteröffnung (G-1) zu bilden, durch die das Futter in einen inneren Bereich (23) der Schlüsselanordnung gelangen kann; gekennzeichnet durch mindestens eine Brutfütteröffnung (40), die in der Fallrohranordnung (31) oberhalb des freien Endes (32) ausgebildet ist; und Mittel (50) zum Abdecken und Freigeben der Brutfütteröffnung (40), um einerseits bei freigegebener Brutfütteröffnung (40) das Futter von der Fördereinrichtung (14) durch einen oberen Innenbereich der Fallrohranordnung (31) dann aus der Brutfütteröffnung (40) an der Außenseite der Fallrohranordnung (31) in einen Außenbereich (24) der Schlüsselanordnung zum Füttern von verhältnismäßig unausgewachsenem Geflügel fließen zu lassen, und andererseits bei abgedeckter Brutfütteröffnung (40) das Futter von der Fördereinrichtung (14) durch obere und untere Innenbereiche der Fallrohranordnung (31) durch das freie Ende (32) der Fallrohranordnung in einen Innenbereich (23) der Schlüsselanordnung fließen zu lassen, wobei das freie Ende (32) und die Schlüsselanordnung (21) zusammen die Fütteröffnung (G-1) zum Füttern von verhältnismäßig ausgewachsenem Geflügel im Innenbereich (23) der Schlüsselanordnung dient.

2. Futtertrog nach Anspruch 1, dadurch gekennzeichnet, daß die Mittel zum Abdecken und Freigeben der Brutfütteröffnung (40) durch eine Ringanordnung (50) gebildet werden, die die Fallrohranordnung (31) umgibt und bewegbar ist.

3. Futtertrog nach Anspruch 2, dadurch gekennzeichnet, daß die Ringanordnung (50) zum Abdecken und Freigeben der Brutfütteröffnung (40) der Fallrohranordnung (31) direkt mit der Schlüsselanordnung (21) gekuppelt ist, und eine begrenzte axiale Bewegung der Fallrohranordnung (31) der-

art zuläßt, daß ein gleichzeitiges Freigeben der Öffnung (40) und Schließen der Fütteröffnung (G-1) oder gleichzeitiges Abdecken der Öffnung (40) und Öffnen der Fütteröffnung (G-1) erfolgt.

4. Futtertrog nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Ringanordnung (50) eine Schraubenanordnung mit einem ersten, an der Ringanordnung (50) befestigten Schraubelement (51) und mit einem zweiten, mit der Fallrohranordnung (31) zusammenarbeitenden Schraubelement aufweist, wodurch eine Relativbewegung zwischen dem ersten und dem zweiten Schraubelement (51, 52) eine Einstellung der Größe der ersten Fütteröffnung (G-1) und eine entsprechende Einstellung des Futterflusses durch die erste Fütteröffnung (G-1) bewirkt.

5. Futtertrog nach Anspruch 4, gekennzeichnet durch Rastmittel (59, 69) zwischen dem ersten und dem zweiten Schraubelement (51, 52) zum Feststellen der Schraubelemente (51, 52) in jeweils einer von mehreren vorbestimmten Rastpositionen.

6. Futtertrog nach einem der vorstehenden Ansprüche, gekennzeichnet durch eine Schürzenanordnung (33), die sich außerhalb der Fallrohranordnung (31) nach unten in Form eines zweiten freien Endes (34) erstreckt und zusammen mit der Schlüsselanordnung (21) eine zweite Fütteröffnung (G-2) flußabwärts der ersten Fütteröffnung (G-1) bildet, durch die Futter zum Füttern von Geflügel (P) in die Schlüsselanordnung fließen kann.

7. Futtertrog nach Anspruch 6, dadurch gekennzeichnet, daß die Schürzenanordnung (33) außerdem eine den Futterfluß führende Abschirmung bildet, um den Futterfluß von der Brutfütteröffnung (40) in einen Außenbereich (24) der Schlüsselanordnung zum Füttern von verhältnismäßig unausgewachsenem Geflügel zu leiten.

8. Futtertrog nach Anspruch 3, dadurch gekennzeichnet, daß die Fallrohranordnung (31) und die Schürzenanordnung (33) eine solche vertikale Ausdehnung haben, daß beim Bewegen der Fallrohranordnung (31) gegenüber der Ringanordnung (50) zwecks Freigabe der Brutfütteröffnung (40) das freie Ende (32) der Fallrohranordnung und/oder das freie Ende (34) der Schürzenanordnung die Schlüsselanordnung (21) etwa berühren, um einen Futterfluß in den Innenbereich (23) der Schlüsselanordnung (21) zu verhindern.

9. Futtertrog nach Anspruch 3, gekennzeichnet durch eine Gitteranordnung (60), die die Ringanordnung (50) und die Schlüsselanordnung (21) miteinander verbindet, um die Ringanordnung (50) in einer vorbestimmten Höhe oberhalb der Schlüsselanordnung (21) anzukuppeln.

10. Futtertrog nach Anspruch 9, dadurch gekennzeichnet, daß die Gitteranordnung (60) aus einer Mehrzahl von Gitterstäben (62, 64, 66) besteht, die sich von der Ringanordnung (50) nach außen erstrecken; und daß eine Gitterringanordnung (68) die Gitterstäbe (62, 64, 66) an ihren äußeren Enden miteinander verbindet und dauernd an einem Rand (26) der Schlüsselanordnung (21) anliegt.

11. Futtertrog nach Anspruch 9 oder 10, dadurch gekennzeichnet, daß die Fallrohranordnung (31) mit einer Schulter (37) versehen ist, die an der Ringanordnung (50) angreift, so daß die Gitteranordnung (60) und die Schlüsselanordnung (21) abhängig voneinander durch die Fallrohranordnung (31) gestützt werden können.

12. Futtertrog nach Anspruch 11, dadurch gekennzeichnet, daß die Schlüsselanordnung (21) mit einer temporären, zusätzlichen Befestigungsanordnung (72) versehen ist, um die Schlüsselanordnung (21) an der Gitterringanordnung (68) an einem einzigen Punkt zu befestigen, so daß die Schlüsselanordnung (21) von der Gitterringanordnung (68) zum Reinigen des Futtertroges fortgeschwenkt werden kann.

13. Futtertrog nach einem der Ansprüche 10 bis 12, dadurch gekennzeichnet, daß die Gitterringanordnung mit einer nach Innen zeigenden, eine Neigung verhin­dernden Verlängerung (70) versehen ist.

Revendications

1. Appareil d'alimentation (10) pour volailles (P) et analogues apte à recevoir de la nourriture provenant d'un convoyeur (14) et à présenter la nourriture, ledit appareil d'alimentation comprenant une cuvette (21) destinée à retenir et à présenter la nourriture déversée, un tube d'alimentation (31) s'étendant depuis le convoyeur (14) jusqu'à une extrémité distale (32) située au-dessus de la cuvette (21), l'extrémité distale (32) et la cuvette (21) étant mobiles l'une par rapport à l'autre de façon à délimiter un orifice d'alimentation (G-1) par lequel la nourriture peut passer dans une zone intérieure de la cuvette (23), caractérisé en ce qu'il comprend au moins une orifice d'alimentation de poussins (40) délimité dans le tube d'alimentation (31) au-dessus de l'extrémité distale (32), et des moyens (50) permettent de masquer et de découvrir en alternance l'orifice d'alimentation de poussins (40) de façon à permettre un écoulement de la nourriture, lorsque l'orifice d'alimentation de poussins (40) est découvert, depuis le convoyeur (14), à travers une portion intérieure supérieure du tube d'alimentation (31), pour sortir par l'orifice d'alimentation de poussins (40) et tomber ensuite extérieurement le long du tube d'alimentation (31) jusqu'à une zone extérieure (24) de la cuvette en vue de sa consommation par des volailles relativement peu mûres et, en variante, pour permettre un écoulement de la nourriture, lorsque l'orifice d'alimentation de poussins (40) est masqué, depuis le convoyeur (14), à travers des portions intérieures supérieure et par conséquent inférieure du tube d'alimentation (31) pour passer au-delà de l'extrémité distale (32) du tube d'alimentation, l'extrémité distale (32) et la cuvette (21) délimitant entre eux l'orifice d'alimentation (G-1) par lequel la nourriture peut passer vers la zone intérieure (23) de la cuvette en vue de sa consommation par des volailles relativement mûres.

2. Appareil d'alimentation selon la revendica-

tion 1, caractérisé en ce que les moyens permettant de masquer et de découvrir en alternance l'orifice d'alimentation de poussins (40) sont constitués d'un collier (50) entourant le tube d'alimentation (31) de manière mobile.

3. Appareil d'alimentation selon la revendication 2, caractérisé en ce que le collier (50) permettant de masquer et de découvrir en alternance l'ouverture de l'orifice d'alimentation de poussins (40) ménagé dans le tube d'alimentation (31) est raccordé directement à la cuvette (21) pour permettre au tube d'alimentation (31) de la traverser avec un mouvement axial limité, de façon à provoquer simultanément une mise à découvert de ladite ouverture (40) et la fermeture de l'orifice d'alimentation (G-1) ou bien la fermeture de ladite ouverture (40) et la libération dudit orifice (G-1).

4. Appareil d'alimentation selon la revendication 2 ou 3, caractérisé en ce que le collier (50) comprend une came à vis constituée d'un premier élément de came à vis (51) fixé sur le collier (50) et un second élément de came à vis (52) pouvant coopérer avec le tube d'alimentation (31), de sorte qu'un mouvement relatif des premier et second éléments de came à vis (51, 52) provoque une modification des dimensions du premier orifice d'alimentation (G-1) et un ajustement correspondant de l'écoulement de nourriture traversant le premier orifice d'alimentation (G-1).

5. Appareil d'alimentation selon la revendication 4, caractérisé en ce que des moyens de détente (59, 69) sont interposés entre les premier et second éléments de came à vis (51, 52) pour bloquer les éléments de came à vis (51, 52) dans l'une quelconque d'un nombre discret de positions présélectionnées.

6. Appareil d'alimentation selon l'une quelconque des revendications précédentes, caractérisé en ce qu'il comprend une jupe (33) s'étendant vers le bas et vers l'extérieur par rapport au tube d'alimentation (31) jusqu'à une seconde extrémité distale (34) pour délimiter, avec la cuvette (21), un second orifice d'alimentation (G-2) situé en aval du premier orifice d'alimentation (G-1) et à travers lequel la nourriture peut passer vers la cuvette (21) en vue de sa consommation par les volailles (P).

7. Appareil d'alimentation pour volailles, selon la revendication 6, caractérisé en ce que la jupe (33) délimite en outre un écran d'orientation de

l'écoulement de nourriture pour diriger celui-ci depuis l'ouverture de l'orifice d'alimentation de poussins (40) vers une portion extérieure (24) de la cuvette en vue de sa consommation par des volailles relativement peu mûres.

8. Appareil d'alimentation selon la revendication 3, caractérisé en ce que le tube d'alimentation (31) et la jupe (33) ont une longueur verticale telle que, lorsque le tube d'alimentation (31) est déplacé par rapport au collier (50) pour découvrir l'ouverture de l'orifice d'alimentation de poussins (40), l'extrémité distale (32) du tube d'alimentation et/ou l'extrémité distale (34) de la jupe entre(nt) sensiblement en contact avec la cuvette (21), arrêtant de ce fait l'écoulement de nourriture vers la portion intérieure (23) de la cuvette (21).

9. Appareil d'alimentation selon la revendication 3, caractérisé en ce qu'il comprend une grille (60) reilant entre eux le collier (50) et la cuvette (21) de façon à fixer le collier (50) en un emplacement prédéterminé situé au-dessus de la cuvette (21).

10. Appareil d'alimentation selon la revendication 9, caractérisé en ce que la grille (60) est constituée d'une pluralité de rayons (62, 64, 66) s'étendant vers l'extérieur depuis le collier (50), et un rebord (68) de la grille reilant entre eux les rayons (62, 64, 66) par leurs extrémités extérieures et adapté pour être en permanence en contact avec un rebord (26) de la cuvette (21).

11. Appareil d'alimentation selon la revendication 9 ou 10, caractérisé en ce que le tube d'alimentation (31) comprend un épaulement (37) adapté pour coopérer avec le collier (50), grâce à quoi la grille (60) et la cuvette (21) peuvent être supportées de manière pendante par le tube d'alimentation (31).

12. Appareil d'alimentation selon la revendication 11, caractérisé en ce que la cuvette (21) comprend des moyens de fixation supplémentaires provisoires (72) permettant de fixer la cuvette (21) au rebord (68) de la grille mais en un seul point, pour permettre de faire pivoter la cuvette (21) afin de l'écarter de la grille (68) en vue du nettoyage de l'appareil.

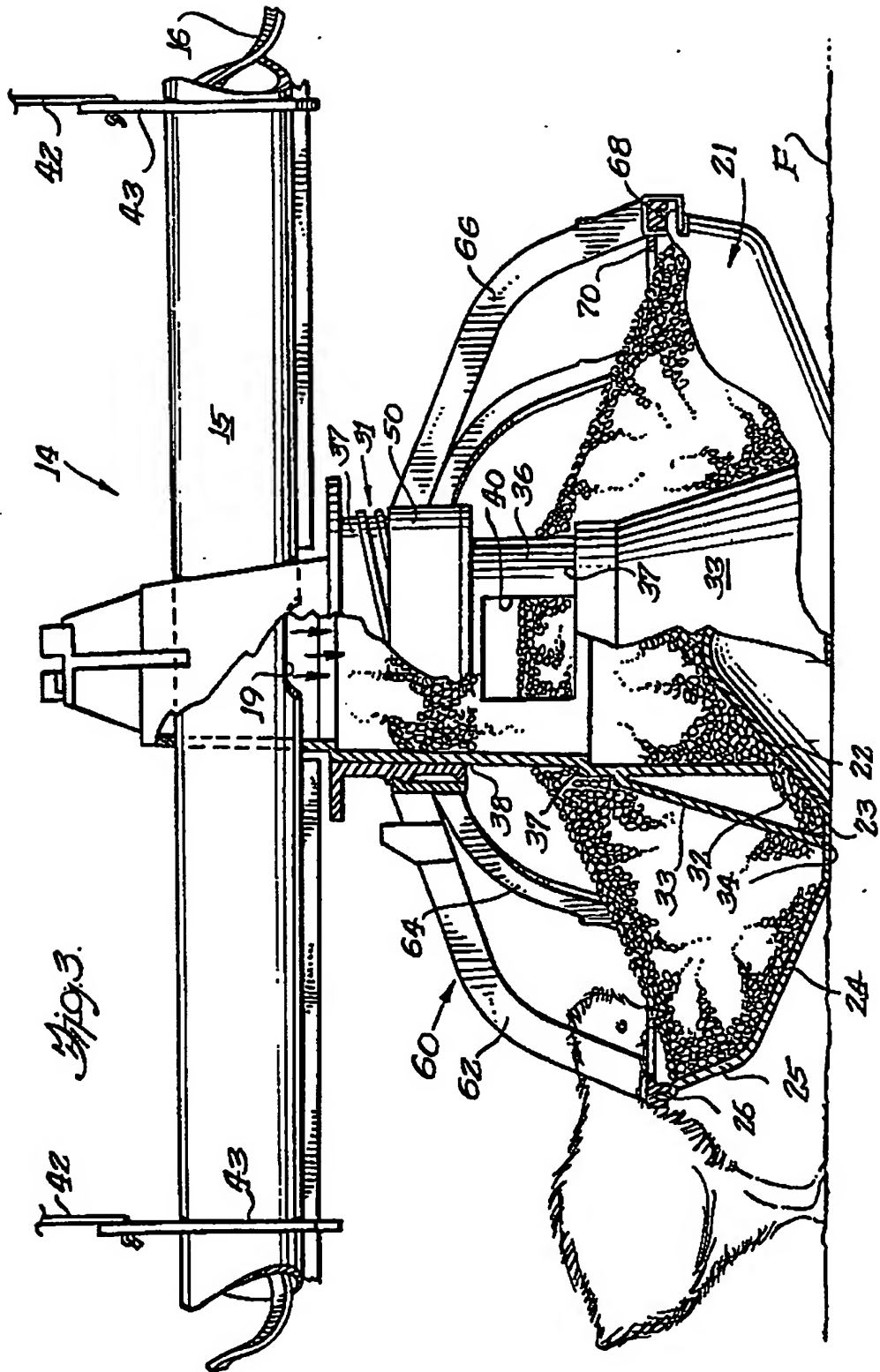
13. Appareil d'alimentation selon l'une quelconque des revendications 10 à 12, caractérisé en ce que le rebord de la grille comprend un prolongement antigaspillage s'étendant vers l'intérieur (70).

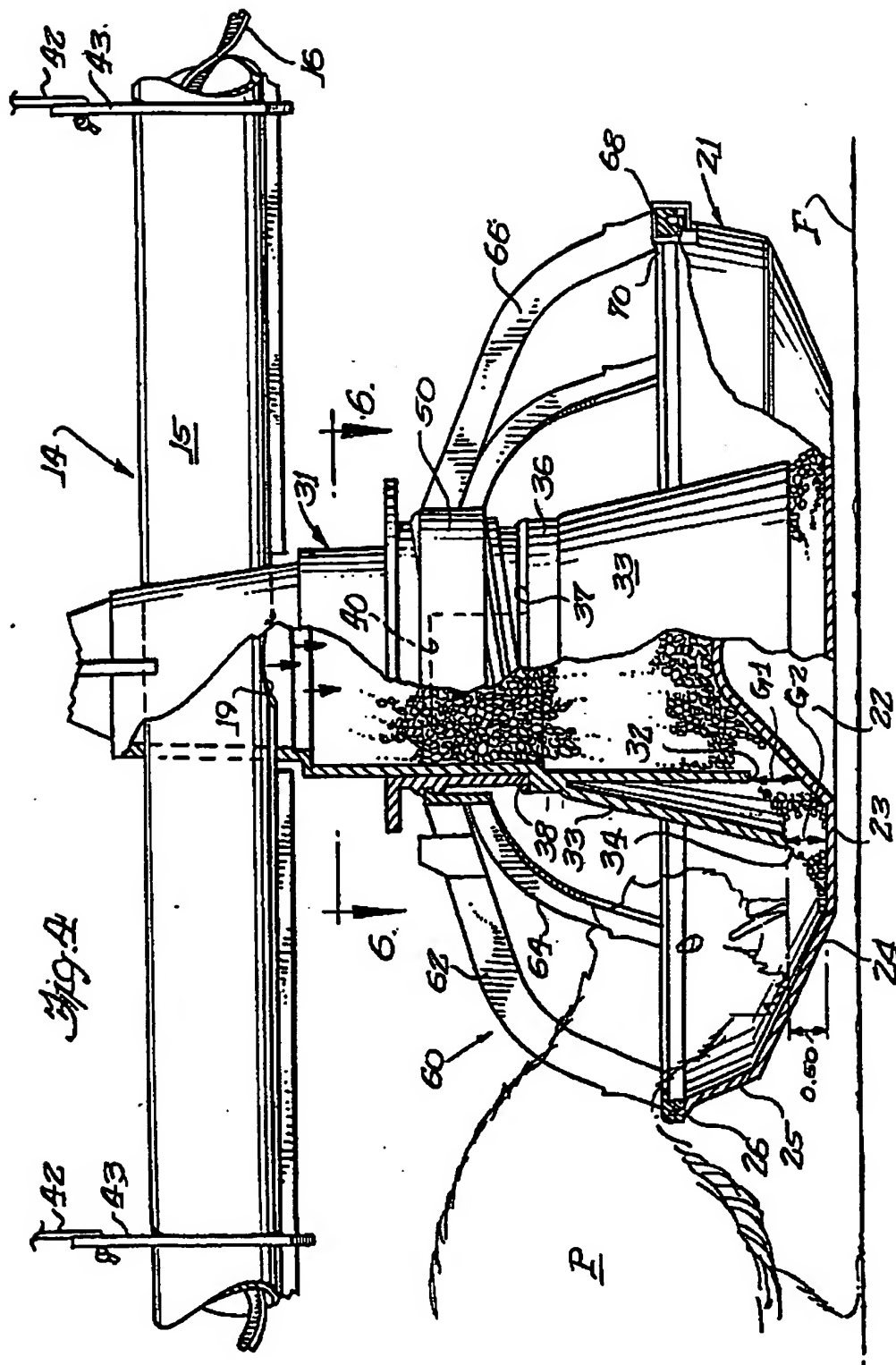
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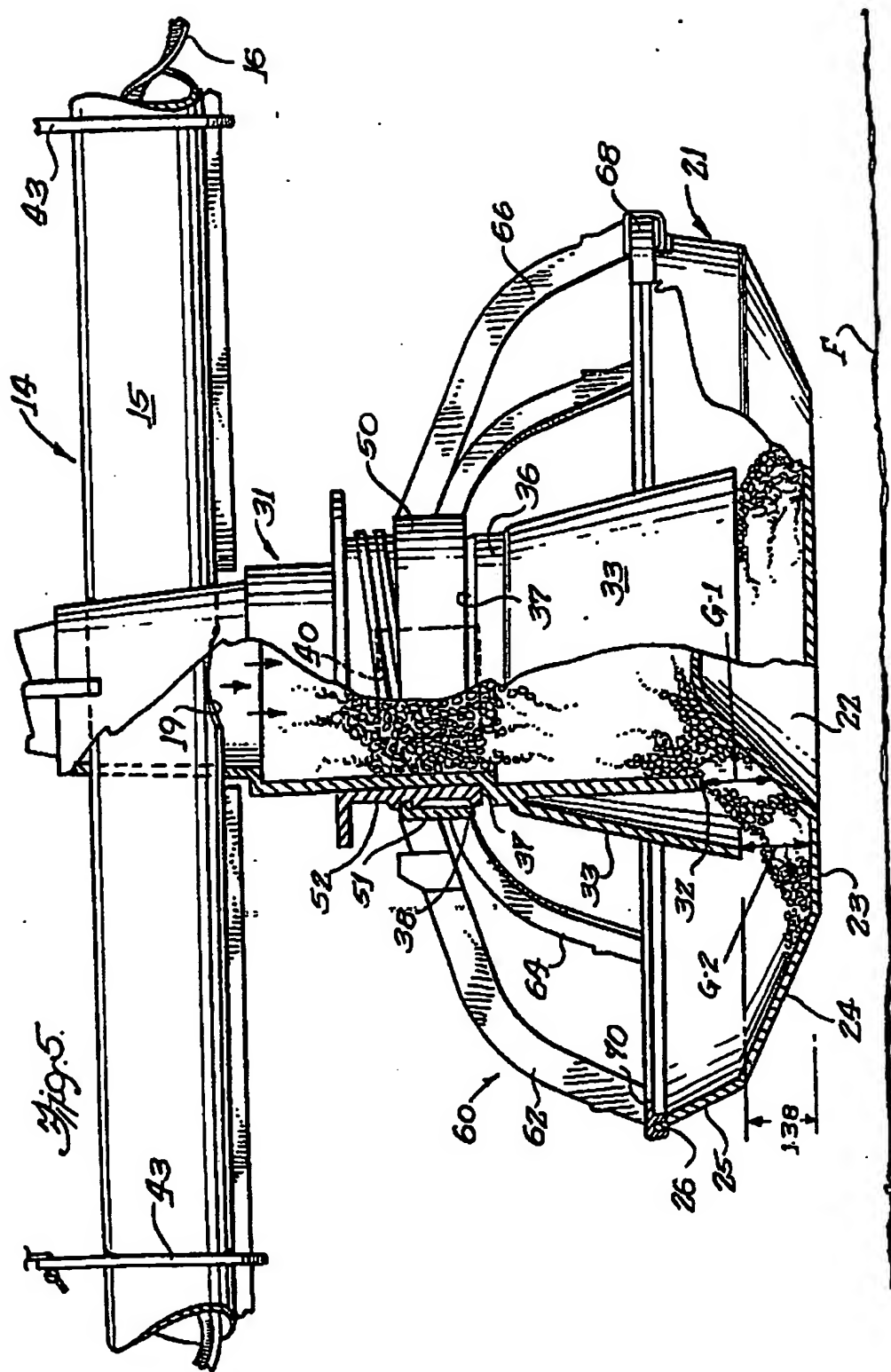


Fig. 6.

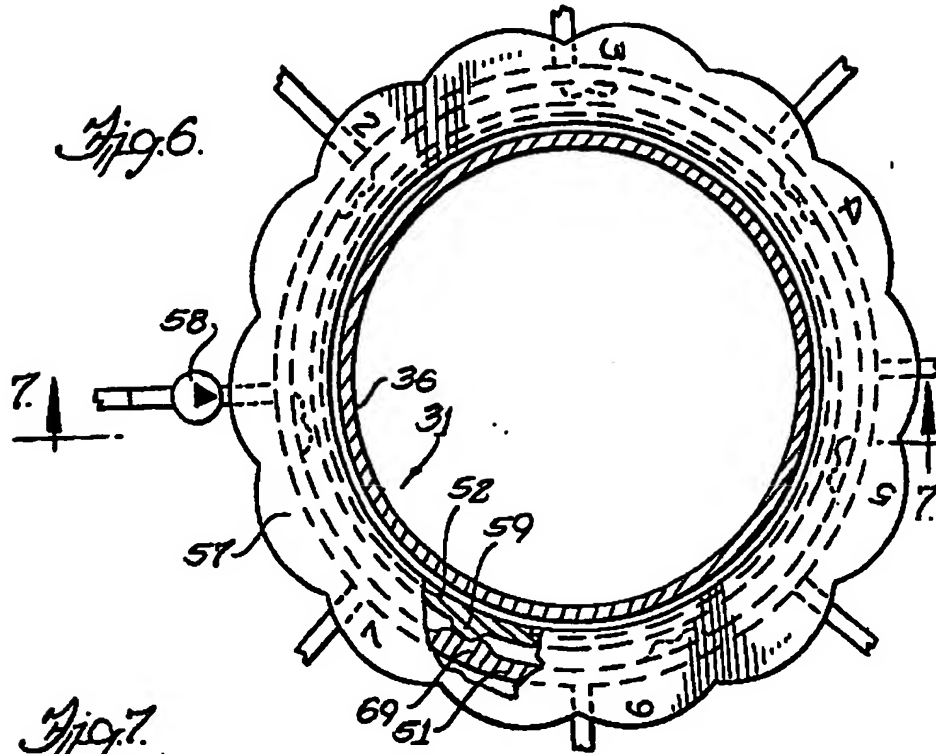


Fig. 7.

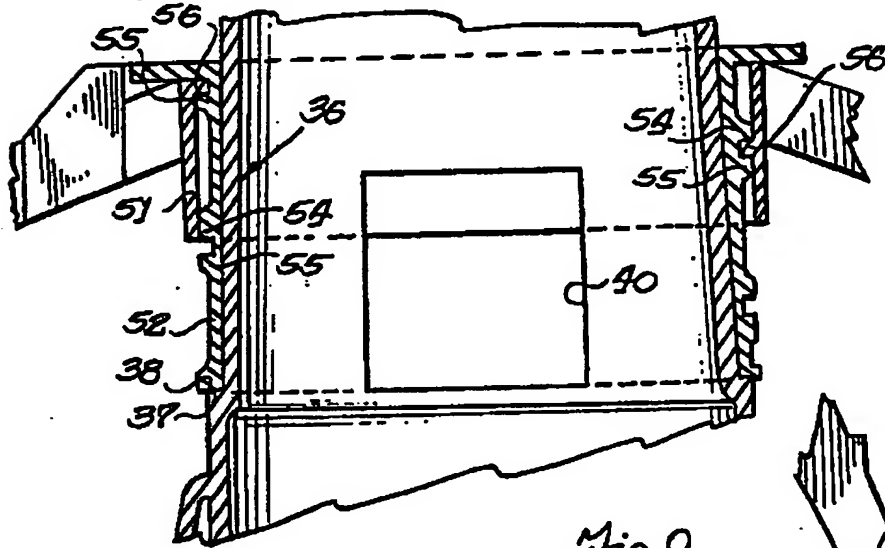


Fig. 8.

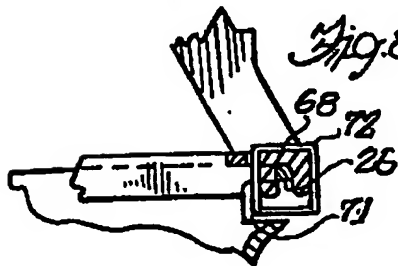
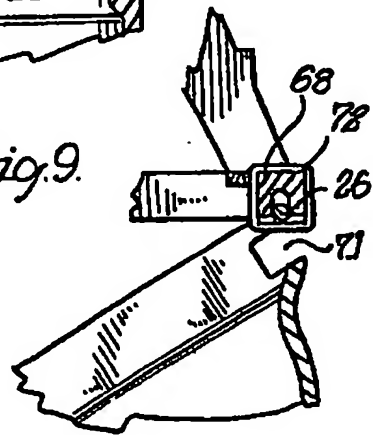


Fig. 9.



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EUROPEAN PATENT APPLICATION

21 Application number: 63301344.4

51 Int. Cl.: **A 01 K 39/012**

22 Date of filing: 11.03.83

30 Priority: 30.09.82 US 428847

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34 Date of publication of application: 18.04.84
Bulletin 84/16

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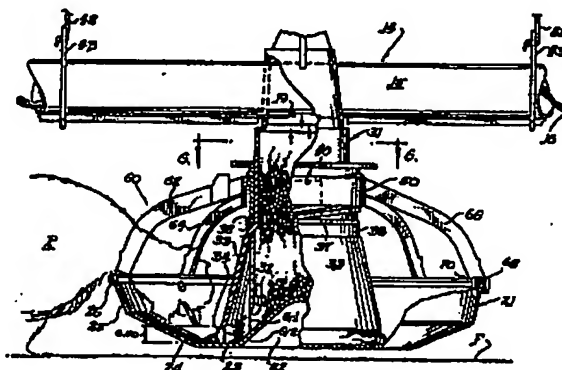
84 Designated Contracting States: **BE DE FR GB IT NL SE**

88 Date of deferred publication of search report: 05.03.85 Bulletin 88/10

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54 Adjustable feeder with brood gate.

57 A feeder (10) for poultry (P) and the like is disclosed. The feeder (10) includes pan means (21) for retaining and presenting delivered feed, and hollow drop tube means (31) adapted to extend from a conveyor (14) to a distal end (32) adjacent the pan means (21). A first feed gate (3-1) defined between the drop tube distal end (32) and the pan (21) permits feed to pass from the drop tube (31) to an inner pan area (23) for consumption by relatively mature poultry. A brood gate opening (40) defined in the drop tube (31) above its distal end (32) permits feed to flow from the conveyor (14) through at least part of the drop tube (37) and out the brood gate opening (40) to an outer portion of the pan (21) for consumption by relatively immature poultry.





European Patent
Office

EUROPEAN SEARCH REPORT

0105571

Application number

EP 83 30 1344

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 8)
A, D	US-A-3 911 868 (BREMBECK)		A 01 K 39/012
A	FR-A-1 129 736 (BERNARD)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 8)
			A 01 K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20-11-1983	Examiner VILBIG K
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: 83301344.4

(51) Int. Cl.²: **A 01 K 39/012**

(22) Date of filing: 11.03.83

(30) Priority: 30.09.82 US 428847

(43) Date of publication of application:
18.04.84 Bulletin 84/18

(84) Designated Contracting States:
BE DE FR GB IT NL SE

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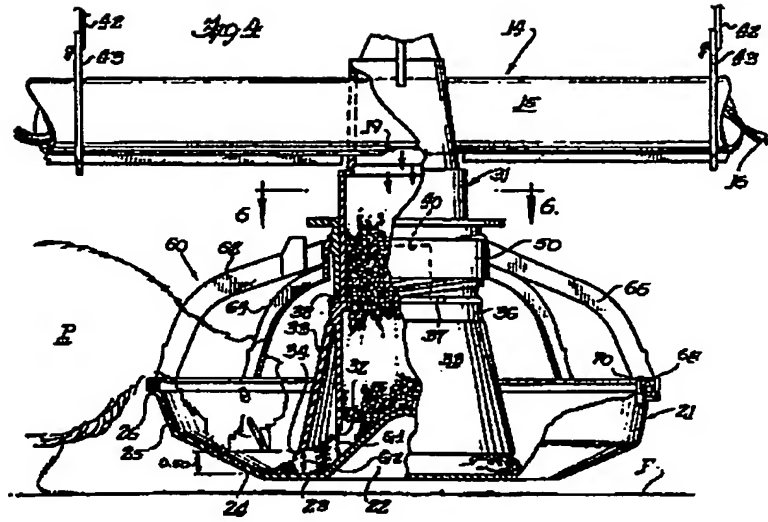
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(54) Adjustable feeder with brood gate.

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EP 1 055 571 A2



ADJUSTABLE FEEDER WITH BROOD GATEBackground of the Invention

This invention relates to animal feeding systems, and more particularly relates to feeder pans for poultry
5 and the like.

Automated feeding systems for poultry and like domestic animals have proved highly successful in modern animal husbandry operations. These systems can supply feed mixtures to a large poultry flock with minimum operator
10 effort. Both the amounts of feed delivered and the proportions of feed ingredients can be regulated and this regulation permits the flock to be inexpensively raised from chicks to mature, commercially valuable broiler birds in a relatively short time.

15 Among the important parts of such automated feeding systems are the feeder units or feeder pans. These units receive feed flow from a feed conveyor, and are disposed on or near the poultry house floor to afford the birds ready access to the feed. Among the patents disclosing such feeders
20 are U.S. Patents 3,911,868 and 4,080,990, for example.

When raising broiler flocks, poultry husbandman traditionally introduce very young chicks to a poultry house,

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and provide feed for the chicks on paper, cardboard, or the like which are laid on the poultry house floor. After the chicks grow in size, they can be introduced to feed contained in poultry feeders.

- 5 It is the general object of the present invention to provide a feeder unit which encourages use from the day the small chicks are introduced into a poultry house through the day the adult birds are removed.

- A more specific object is to offer a feeder unit which
10 provides a configuration and mode of operation especially designed for small chicks, in which feed is presented at an exterior part of the feed pan. A corresponding object is to provide such a feeder which has another configuration and mode of operation for older birds,
15 in which feed is presented at an interior part of the feed pan.

- A related object is to provide a feeder which will change automatically from one configuration and operating mode to the other as the feeder is raised from and lowered to
20 the poultry house floor.

Another object is to provide a feeder which can be adjusted so as to best accommodate any of various types of feed being delivered to older birds.

- Still another object is to provide a feeder which mini-
25 mizes or discourages feed wastage, spoilage, and be-
foulment.

A further object is to provide such a feeder which can be used over a long life with minimum repair and

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maintenance costs.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings. Throughout the description, like reference numerals refer to like parts.

Brief Description of the Drawings

FIGURE 1 is a perspective view showing a poultry house in which are installed several novel feeders of the present invention;

FIG. 2 is a perspective view showing in greater detail the novel feeder during its use by immature chicks;

FIG. 3 is a side elevational view in partial section showing the novel feeder and related apparatus as they appear when immature birds are being fed;

FIG. 4 is a side elevational view in partial section similar to FIG. 3 but showing the feeder as it appears when mature birds are being fed;

FIG. 5 is a side elevational view in partial section similar to FIGS. 3 and 4 but showing the feeder as it appears when adjusted for another type of feed;

FIG. 6 is a fragmentary sectional view taken substantially in the plane of line 6-6 in FIG. 4;

FIG. 7 is a fragmentary sectional view taken substantially in the plane of line 7-7 in FIG. 6;

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FIG. 8 is a fragmentary sectional view taken substantially in the plane of line 8-8 in FIG. 2, showing portions of the feeder grill and pan as they appear when closed for use; and

- 5 FIG. 9 is a fragmentary sectional view similar to FIG. 8 but showing the grill and pan as they appear when opened for cleaning.

Detailed Description

- 10 While the invention will be described in connection with a preferred embodiment, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention.

- 15 Turning first to FIG. 1, there are shown several feeders 10 of the present invention as they appear when being used by poultry P. A feed storage bin 11 is located outside a poultry house 12, and a header conveyor 13 transports feed from the bin 11 to one or more cross or
20 branch conveyors 14. As shown in FIGS. 2-5, these branch conveyors 14 include a conveyor tube 15, and a helical auger member 16 is disposed for rotation within the tube 15 by a motor (not shown). Header drop tubes 17 and intermediate hoppers 18 or other devices insure the correct
25 delivery of feed from the header conveyor 13 to the branch conveyor 14 (FIG. 1).

A general examination of FIGS. 2-5 will show that the novel feeder 10 includes a pan means 21 for retaining and presenting delivered feed. This pan means 21 can

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be considered to include a central cone 22 and an adjacent inner portion 23, which here is oriented horizontally. A rising outer pan portion 24 leads to a steeper portion 25 and terminates in a pan rim 26.

- 5 A drop tube means 31 is adapted to extend from the conveyor 14 down into the pan 21. As can be envisioned from FIGS. 3-5, feed delivered by the conveyor 14 through a tube hole 19 falls down the interior of the drop tube assembly 31 and into the pan 21. Here, this drop tube
10 assembly 31 terminates at a distal end 32. A skirt 33, of generally conical configuration, extends away from the main cylinder 36 of the drop tube means 31 to a skirt distal end 34. To minimize expense, the skirt 33 can be formed integral with the adjacent portions of the drop
15 tube main cylinder 36.

- A collar assembly 50 surrounds the drop tube 31, and is held above the pan 21 by grillwork 60. This grill means or grillwork 60 interconnects the collar 50 and pan means 21 so as to affix the collar 50 at a predetermined location
20 above the pan. To this end, the grill means includes a plurality of spokes 62, 64, 66 extending outwardly from the collar, to a grill rim 68. The rim 68 interconnects the spokes at their outer end and continuously engages a mating rim 26 of the pan means 21.

- 25 In accordance with the invention, the illustrated feeder can be used to present feed to either immature poultry, or to older, larger, more mature birds. To accomplish this, a brood gate opening 40 is defined in the drop tube cylinder 36 above the drop tube means distal end 32 and
30 above the top of the skirt 33. A relatively uniform quantity of feed can be provided around the entire

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circumference of the pan by defining two, three, or more feed brood gate openings in the drop tube means.

The drop tube means 31 is of sufficient vertical extent so that, when it is moved downwardly to a first non-pan-carrying position, the drop tube means distal end 32 and/or skirt means distal end 34 substantially engage the pan means 21, thereby inhibiting feed flow into the inner portion of the pan means from the bottom of the drop tube. Rather, feed is permitted to flow from the conveyor 14 through an upper interior portion 37 of the drop tube means 31, then out the exposed or unmasked brood gate opening 40, and then down the outside of the skirt means 33 to an outer pan area. By dispensing a relatively large amount of feed through the brood gate opening 40, the feed can be accumulated and displayed in the position and manner shown in FIG. 3 so that the immature poultry or chicks C can find it and consume it. Conveniently, this feeder configuration is obtained by permitting the pan 21 to rest on the poultry house floor F, and by permitting the drop tube 31 to slide down through the collar 50 so as to rest the distal ends 32 and 34 in the pan 21. As feed builds up in the pan 21, the brood gate opening 40 is covered; in this way, excessive feed delivery and buildup is discouraged, and feed wastage is inhibited.

After the chicks have grown for, say, five to ten days, they are able to reach interior portions of the feeder, and to obtain feed from even a slightly elevated pan. Accordingly, the drop tube 31 can be raised and the feeder automatically reconfigured for use by the more mature poultry. To reconfigure the feeder, the conveyor 14 is raised; here, this raising action is accomplished by drawing up the cables 42 and interconnecting hangars 43.

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- When the drop tube means 31 is raised into the second, pan-carrying positions shown in FIGS. 4 and 5, the brood gate opening 40 is masked by the collar means 50 and the drop tube and skirt distal ends 32 and 34 are pulled away from the pan 21. Under these circumstances, a first gate opening G-1 is defined between the drop tube distal end 32 and the pan means 21, and a second feed flow gate G-2 is defined between the skirt means distal end 34 and the pan means 21. Feed is thus permitted to flow from the conveyor 14 through upper and lower interior portions of the drop tube 31, then past the drop tube distal end 32, past the skirt distal end 34, and into an inner pan means area where it can be reached for consumption by the relatively mature poultry.
- 15 To dependingly support the grillwork 60 and pan 21 above the floor F, and to provide the gates G-1 and G-2, the drop tube cylinder 36 is provided with a shoulder 37. When the drop tube assembly 31 is pulled up, this shoulder 37 engages a bottom interior corner 38 of the collar 50.
- 20 In use, the pan means 21 can be conveniently located at least a small distance above the poultry house floor F, as can be envisioned by comparing FIGS. 4 and 5 with FIG. 3. In this way, relatively small amounts of feed can be dispensed and displayed for consumption by the relatively mature poultry P. These birds have learned to eat from the pan, of course, and the design of the feeder unit inhibits raking, tossing, and wasting the feed.
- 25 In accordance with another aspect of the invention, the poultry feeder and the feed gates G-1 and G-2 can be adjusted so as to best accommodate any of various types of feed being delivered to the older birds. For example,
- 30

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relatively moist feed can be somewhat sticky in its consistency, and can require relatively large feed gate openings to accommodate proper dispensation. On the other hand, relatively dry feed requires relatively small feed gate openings to offer dispensation in a proper manner. To this end, then, the collar assembly 50 surrounding the drop tube includes a first screw cam element 51, which here constitutes an outer grill collar ring. A second screw cam element 52 is adapted to loosely surround the drop tube means central cylinder 36, as especially shown in FIGS. 3-5 and 7. The lower corner 38 of this element 52 directly engages the drop tube shoulder 37 when the drop tube 31 is pulled upwardly. Projections 54, 55 on the second cam element 52 form a helical cam track or female screw thread of extended pitch which engages a mating helical male thread projection 56 formed on the first cam element 51. As can be envisioned by comparing FIGS. 4 and 5, relative motion between the first and second screw cam elements 51, 52 causes the pan 21 to move up or down relative to the drop tube 31 and its shoulder 37 and the distal ends 32, 34. This relative motion causes consequent adjustment in the sizes of the first gate G-1 and second gate G-2. In this way, the poultryman can adjust the amount of feed which is presented in the inner portion of the pan to the consuming, mature, poultry. It has been found that a minimum gate space of about 1/2 inch and a maximum gate space of about 1-3/8 inch at the second gate G-2 provides a suitable variation so as to properly display and present a variety of types and amounts of feed. This gate variation is designed to accommodate variations in feed adhesive characteristics or consistency for a wide variety of feed formulations.

In carrying out the invention, the poultry husbandman can be provided with a clear indication of the gate

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settings. To do this, several reference numeral indicia can be applied around a collar top annular extension 57 adjacent the drop tube assembly 31 as shown in FIG. 6. An embossed indicator, such as an arrow symbol 58 can
5 be formed on one of the spokes 62. By aligning the indicator 58 with a given indicia number on the collar 57, a feed gate space of known size can be provided.

To secure the screw cam elements in a selected given position, and consequently locate the feed gates G-1 and G-2
10 in desired positions or sizes, one or more embossments 59 can be formed on one of the screw cam elements 52, and a discrete series of mating recesses 69 can be formed on the other of the screw cam elements 51 to provide a
15 more or less secure locking arrangement. When the embossments 59 and the recesses 69 are formed on confronting surfaces in the interior of the assembled screw cam 51, 52 as shown in FIG. 6, the arrangement minimizes the interference of dirt with the screw cam detent action.

As shown in FIGS. 6 and 7, the screw cam elements 51 and
20 52 are normally locked together, but the locked elements 51 and 52 can rotate freely about the encircled drop tube cylinder 36. Thus, the collar 50, grillwork 60 and pan 21 can rotate relative to the drop tube 31. If the poultry accidentally or intentionally cause this rotation, any
25 feed bridges within the drop tube 31 or at the feed gates G-1 or G-2 can be broken, and temporarily pent-up feed will flow into the pan for consumption. A positive flow of feed is thus encouraged.

When the feeder is in use as shown in FIGS. 1-5, the grill
30 rim 68 continuously engages the pan rim 26. To further

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discourage feed raking and tossing, an anti-rake grill rim extension 70 overlies the extreme outer portions of the pan 21. It is contemplated that the pan 21 and other feeder parts can be formed of a suitable resinous plastic such as Hercules 7523 polypropylene or Shell Chemical 7522 polypropylene by any of several known molding processes. By forming the anti-rake extension 70 on the grill rim 68, a difficult-to-accommodate undercut formation will be avoided in the pan molding design and process.

It is another feature of the invention that the feeder unit can be easily opened and cleaned after the flock has been removed from the poultry house. To this end, the pan 21 is provided with one or more slots 71 adjacent the pan rim 26, as shown in FIGS. 8 and 9. At one of these slots, a more or other convenient supplemental attachment 72 attaches the pan 21 to the grill rim 68 at but a single point. This permits the poultryman to raise the feeders from the floor, and pull or pivot the pan 21 away from the grill rim 68, as shown in FIG. 9. When the feeder is opened in this way, the unit can be easily, quickly and thoroughly cleaned.

C L A I M S

1. A feeder (10) for poultry (P) and the like adapted to receive feed from a conveyor (14) and to present the feed, alternatively, to immature poultry and to
5 mature poultry, and including pan means (21) for retaining and presenting delivered feed, and drop tube means (31) adapted to extend from the conveyor (14) to a distal end (32) above the pan means (21), the feeder being characterized by at least one brood gate opening
10 (40) being defined in the drop tube means (31) above the distal end (32), and means (50) for alternatively masking and exposing the brood gate opening (40) so as to permit feed flow, when the brood gate opening (40) is exposed, from the conveyor (14) through an
15 upper interior portion (37) of the drop tube means (31), thence out through the brood gate opening (40), and thence down the outside of the drop tube means (31) to an outer pan means area (24) for consumption by relatively immature poultry, and to alternatively
20 permit feed flow, when the brood gate opening (40) is masked, from the conveyor (14) through upper and thence lower interior portions of the drop tube means (31) and past the drop tube means distal end (32), the distal end (32) and pan means (21) together defining
25 a first feed gate (G-1) through which feed can pass to an inner pan means area (23) for consumption by relatively mature poultry.
2. A feeder according to claim 1 wherein said means (50) for alternately masking and exposing said brood
30 gate opening is characterized by collar means (50) surrounding said drop tube means (31).

3. A feeder according to claim 1 further characterized by skirt means (33) extending downwardly and outwardly from said drop tube means (31) to a distal end (34) to define, with the pan means, a second feed gate (G-2) 5 through which feed can pass into the pan means (21) for consumption by poultry (P).

4. A feeder according to claim 3 further characterized by screw cam means (50), the screw cam means having a first screw cam element (51) affixed to said collar 10 means (50), and a second screw cam element (52) cooperating with said drop tube means (31), whereby relative motion of the first and second screw cam elements (51, 52) causes adjustment in the size of said first feed gate (G-1), and consequent adjustment into feed flow 15 through the first feed gate (G-1).

5. A feeder according to claim 4 further characterized by detent means (59, 60) interposed between said first and said second screw cam elements (51, 52) for securing the screw cam elements (51, 52) in any one of a 20 discrete number of pre-selected positions.

6. A feeder (10) for poultry (P) and the like which is adapted to receive and present feed delivered by a conveyor (14), the feeder including pan means (21) for retaining and presenting delivered feed, hollow 25 drop tube means (31) adapted to extend from the conveyor (14) to a distal end (32) adjacent the pan means (21) to define, with the pan means (21), a first feed gate (G-1) through which feed can pass, the feeder characterized by an inner pan area (23) into which feed moves 30 for consumption by relatively mature poultry, a brood

gate opening (40) being defined in the drop tube means (31) above the drop tube means distal end (32) for permitting feed flow from the conveyor (14) through at least part of the drop tube means (31) and out the
5 brood gate opening (40) to outer pan means (24) for consumption by relatively immature poultry.

7. A feeder for poultry according to claim 6 further characterized by skirt means (33) extending downwardly and outwardly from the drop tube means (31) to a skirt
10 distal end (34) to define, together with the pan means (21), a second feed gate (G-2) through which feed can pass to an inner portion (23) of the pan means (21) for consumption by relatively mature poultry, the skirt means (33) also defining a feed-flow-directing shield
15 to direct feed flow from the brood gate opening (40) to an outer portion of the pan means (24) for consumption by relatively immature poultry.

8. A feeder according to claim 6 further characterized by collar means (50) surrounding the drop tube means
20 (31) but permitting the drop tube means (31) to move with limited axial motion therethrough so as to cause the brood gate opening (40) in the drop tube means (31) to be alternately exposed and masked by the collar means (50).

25 9. A feeder according to claim 8 further characterized by at least one of said drop tube means (31) and skirt means (33) being of sufficient vertical extent so that, when the drop tube means (31) is moved relative to the collar means (50) so as to expose the brood gate
30 opening (40), the drop tube means distal end (32) and/or skirt means distal end (34) substantially engages the

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pan means (21), thereby inhibiting feed flow into the inner portion (23) of the pan means (21).

10. A feeder according to claim 8 further characterized by grill means (60) interconnecting the collar means
5 (50) and pan means (21) so as to affix the collar means (50) at a predetermined location above the pan means (21).

11. A feeder according to claim 10 wherein said grill means (60) is characterized by a plurality of spokes
10 (62, 64, 66) extending outwardly from the collar means (50), and grill rim means (68) interconnecting the spokes (62, 64, 66) at their outer ends and adapted to continuously engage a rim (26) of the pan means (21).

12. A feeder according to claim 10 wherein said drop
15 tube means (31) is characterized by shoulder means (37) adapted to engage said collar means (50), whereby said grill means (60) and said pan means (21) can be dependently supported from said drop tube means (31).

13. A feeder according to claim 11 wherein said pan
20 means (21) is characterized by temporary, supplemental attachment means (72) for attaching said pan means (21) to said grill rim means (68) at but a single point, whereby to permit said pan means (21) to be pivoted away from said grill means (68) for feeder cleaning.

25 14. A feeder according to claim 11 wherein said grill rim means is characterized by inwardly extending anti-rake extension means (70).

Fig. 1.

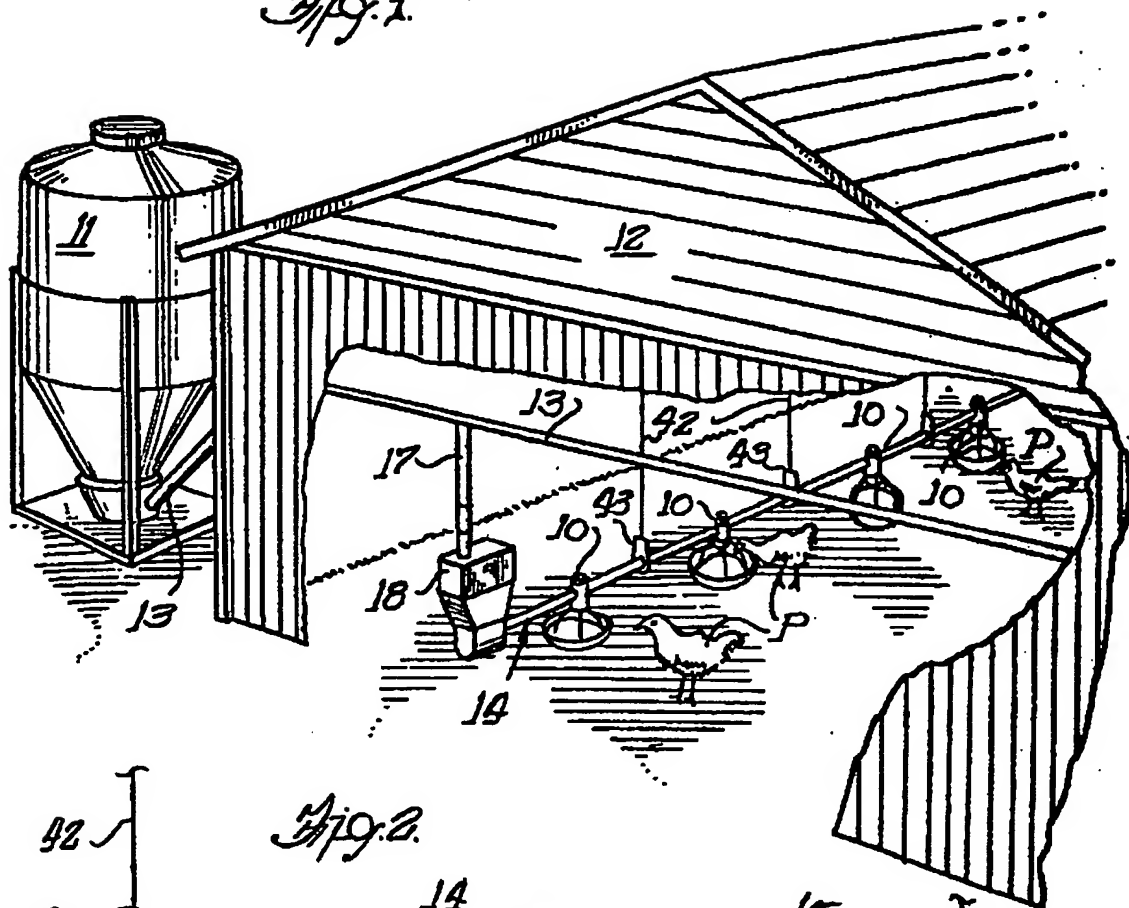


Fig. 2.

